

Application Number 10/045,717
Amendment in response to Office Action mailed August 24, 2005

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claim 1 (Original): A method comprising:

storing route data representing routes within a computer network;
storing next hop data representing network devices neighboring a network router; and
storing indirect next hop data that maps at least a subset of the routes represented by the route data to a common portion of the next hop data.

Claim 2 (Original): The method of claim 1, wherein storing route data comprises storing a radix tree having a set of leaf nodes, wherein each leaf node corresponds to a destination within the network.

Claim 3 (Original): The method of claim 2, wherein storing the indirect next hop data comprises:

storing a reference to a primary next hop, and
storing a reference to a backup next hop.

Claim 4 (Original): The method of claim 3, further comprising routing packets to the backup next hop in response to a network event.

Claim 5 (Original): The method of claim 2, wherein storing the indirect next hop data comprises storing a data pointer within each of the leaf nodes.

Claim 6 (Original): The method of claim 1, wherein storing the next hop data comprises storing an array of next hop data elements, and further wherein the common portion of the next hop data comprises at least one next hop data element.

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Claim 7 (Original): The method of claim 1, further comprising:
receiving a packet comprising network update information; and
modifying the common portion of the next hop data in response to the network update information.

Claim 8 (Original): The method of claim 1, further comprising:
storing routing information within a routing engine, wherein the routing information represents routes within a network; and
storing the route data, the indirect next hop data and the next hop data within a packet forwarding engine.

Claim 9 (Original): The method of claim 8, further comprising:
receiving a packet comprising network topology update information;
updating the routing information within the routing engine; and
issuing a message from the routing engine to direct the packet forwarding engine to modify the common portion of the next hop data in response to the network update information.

Claim 10 (Original): The method of claim 8, wherein storing the routing information includes storing a copy of the route data, the indirect next hop data and the next hop data stored within the packet forwarding engine.

Claim 11 (Original): The method of claim 9, wherein storing the routing information includes storing a copy of the route data, the indirect next hop data and the next hop data stored within the packet forwarding engine, and issuing the message comprises analyzing the copy to identify the next hop for modification.

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Claim 12 (Currently amended): A computer-readable medium having data structures therein that control forwarding of packets by a network device comprising:

a first data structure to store route data representing destinations within a computer network;

a second data structure to store next hop data representing interfaces to neighboring network devices; and

a set of data structures to store indirect next hop data that map at least a subset of the route data to a common portion of the next hop data.

Claim 13 (Original): The computer-readable medium of claim 12, wherein the first data structure stores a radix tree having a set of leaf nodes, wherein each leaf node corresponds to a destination within a network.

Claim 14 (Original): The computer-readable medium of claim 12, wherein the indirect next hop data comprises a set of data pointers stored within the leaf nodes.

Claim 15 (Original): The computer-readable medium of claim 14, wherein the data pointers include pointers to primary next hops and pointers to backup next hops.

Claim 16 (Original): The computer-readable medium of claim 12, wherein the second data structure comprises an array of the next hop data elements.

Claim 17 (Original): A router comprising a computer-readable medium to store: (i) route data representing routes within a computer network, (ii) next hop data representing neighboring network devices, and (iii) indirect next hop data that maps at least a subset of route data to a common portion of the next hop data.

Claim 18 (Original): The router of claim 17, wherein the indirect next hop data comprises a set of data pointers stored within the leaf nodes.

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Claim 19 (Original): The router of claim 18, wherein the data pointers include pointers to primary next hops and pointers to backup next hops.

Claim 20 (Original): The router of claim 17, wherein some of the next hop data represents software modules for processing data packets.

Claim 21 (Original): The router of claim 20, wherein each of the software modules is selected from one of a packet filter, a policy enforcer and a packet counter.

Claim 22 (Original): The router of claim 17, wherein the route data is arranged to form a radix tree having a set of leaf nodes corresponding to destinations within the network.

Claim 23 (Original): The router of claim 22, wherein the indirect next hop data includes a set of data pointers associated with the leaf nodes.

Claim 24 (Original): A router comprising:

a routing engine to store routing information representing a topology of a network;
and
a packet forwarding engine to store packet forwarding information in accordance with the routing information, the packet forwarding information including (i) route data representing destinations within a computer network, (ii) next hop data representing interfaces to neighboring network devices, and (iii) indirect next hop data that maps a subset of the routes represented by the route data to a common portion of the next hop data.

Claim 25 (Original): The router of claim 24, wherein the routing engine receives a packet comprising network topology update information and, in response to the network topology update information, updates the routing information and directs the packet forwarding engine to modify one of the next hop data.

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Claim 26 (Original): The router of claim 24, wherein the routing information includes data structures storing a copy of the route data, the indirect next hop data and the next hop data stored within the packet forwarding engine.

Claim 27 (Original): The router of claim 26, wherein the routine engine analyzes the data structures to identify the next hop for modification.

Claim 28 (Original): A computer-readable medium having instruction therein for causing a programmable processor within a router to:

- store route data representing routes within a computer network;
- store next hop data representing network devices neighboring a network router; and
- store indirect next hop data that maps at least a subset of the routes represented by the route data to a common portion of the next hop data.

Claim 29 (Original): The computer-readable medium of claim 28, wherein the instructions cause the processor to store route data comprises storing a radix tree having a set of leaf nodes, wherein each leaf node corresponds to a destination within the network.

Claim 30 (Original): The computer-readable medium of claim 29, wherein the instructions cause the processor to store a data pointer within each of the leaf nodes.

Claim 31 (Original): The computer-readable medium of claim 28, wherein the instructions cause the processor to store an array of next hop data elements, and further wherein the portion of the next hop data comprises at least one next hop data elements.

Claim 32 (Original): The computer-readable medium of claim 28, the instructions cause the processor to:

- receive a packet comprising network update information; and
- modify the common portion of the next hop data in response to the network update information.

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Claim 33 (Original): The computer-readable medium of claim 28, the instructions cause the processor to:

store routing information within a routing engine, wherein the routing information represents routes within a network; and
store the route data, the indirect next hop data and the next hop data within a packet forwarding engine.

Claim 34 (Original): The computer-readable medium of claim 33, the instructions cause the processor to:

receive a packet comprising network topology update information;
update the routing information within the routing engine; and
issue a message from the routing engine to direct the packet forwarding engine to modify the common portion of the next hop data in response to the network update information.

Claim 35 (Original): The computer-readable medium of claim 33, wherein the instructions cause the processor to store a copy of the route data, the indirect next hop data and the next hop data stored within the packet forwarding engine.

Claim 36 (Original): The computer-readable medium of claim 33, wherein the instructions cause the processor to store a copy of the route data, the indirect next hop data and the next hop data stored within the packet forwarding engine, and issuing the message comprises analyzing the copy to identify the next hop for modification.

Claim 37 (Original): A method comprising routing packets within a network using indirect next hop data that associates a plurality of routes with a common portion of next hop data.

Claim 38 (Original): The method of claim 37, further comprising
storing route data; and
storing the next hop data.

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Claim 39 (Original): The method of claim 37, further comprising storing pointers to primary next hops and pointers to backup next hops.

Claim 40 (Original): The method of claim 38, wherein storing the route data comprises storing a radix tree having a set of leaf nodes, wherein each leaf node corresponds to a destination within the network, and further wherein storing the indirect next hop data comprises storing a data pointer within each of the leaf nodes.

Claim 41 (Original): The method of claim 37, further comprising:
receiving a packet comprising network update information; and
modifying the common portion of the next hop data in response to the network update information.

Claim 42 (Original): The method of claim 37, further comprising storing the indirect next hop data within a packet forwarding engine.

Claim 43 (Original): The method of claim 42, further comprising:
receiving a packet comprising network topology update information;
issuing a message from a routing engine to direct the packet forwarding engine to modify the common portion of the next hop data in response to the network update information.

Claim 44 (Original): The method of claim 42, further comprising storing a copy of the indirect next hop data within a routing engine.

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